CAMBRIDGE SYSTEMATICS

MnPASS System Study

Executive Summary

final

report

prepared for

Minnesota Department of Transportation

prepared by

Cambridge Systematics, Inc.

with

URS Corporation

April 7, 2005

www.camsys.com

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Executive Summary

WHAT IS MNPASS?

MnPASS is the term used by the Minnesota Department of Transportation (Mn/DOT) to describe "express toll lanes."[1] Express toll lanes provide a congestion-free alternative to highways with high congestion by charging a toll for drivers to use one or more specially designated highway lanes. Mn/DOT is considering two types of MnPASS lanes:

1. High-occupancy toll (HOT) lanes, whereby existing (or proposed) high-occupancy vehicle (HOV) lanes are opened up to non-HOV traffic for a toll; or
2. New highway capacity adjacent to existing highways (either freeways or conventional highways), where all traffic except transit vehicles pays a toll.

In both cases, these MnPASS lanes would have the following characteristics:

- Speeds at or near the posted limits would be maintained by pricing that varies with demand and use of the lanes.
- Collection of the tolls would be automated, through the use of electronic toll collection – there would be no toll booths or cash transactions.
- Variable message signs would be used to advise drivers of the toll rate in place at any given time.
- Heavy trucks in excess of 26,000 pounds would be excluded from the MnPASS lanes.
- Transit vehicles would use the MnPASS lanes for free. Although the study team did not explicitly evaluate the implications of MnPASS on future transit system performance, it did perform a simplified analysis to illustrate the potential synergies between MnPASS and transit.
- Access into and out of the MnPASS lanes would be provided by slip "ramps" with the adjacent general purpose lanes, which would likely require periodic

[1] Formerly known as FAST lanes – Freeing Alternatives for Speedy Transportation. This is the name included in Federal legislation in 2004 for the express toll lane concept that would have had specific statutory requirements associated with it. The current state administration favorably endorsed FAST lanes in a press conference on December 29, 2004, defining them as "… new publicly-owned lanes paid for by private entities which are repaid by users of the lanes." Since that time, Mn/DOT has adopted the MnPASS name to refer to any kind of tolled express lane in Minnesota, and MnPASS is used throughout this report.

breaks in a double-striped lane to allow for merging and weaving between the facilities. Other options are possible, such as "T" ramps from a bridge above. However, the slip-ramp concept is consistent with Mn/DOT's I-394 toll lane demonstration, and was used as the basis for this study.

There are numerous other details regarding how MnPASS lanes might operate that still need to be worked out. However, the above points provide the basic framework.

Mn/DOT is in the process of implementing the first MnPASS project on I-394, generally from I-94 to just west of I-494, with an anticipated opening in May/June 2005. This project involves the conversion of the existing HOV lane to a HOT lane, and has specific design and operational characteristics which may or may not be relevant to other MnPASS lanes that might be implemented later.

STUDY GOALS AND OBJECTIVES

The primary goal of the MnPASS System Study was to evaluate and report any relevant data concerning the impacts of overlaying a MnPASS toll lane system in the Twin Cities Metropolitan area of Minneapolis and St. Paul. The overall objective of the study was to identify a potential Twin Cities Metropolitan Area MnPASS tolling lane system and to provide Mn/DOT and the Metropolitan Council with information on the cost, operational, revenue and system implications of that system. The intent was not to evaluate the benefits of tolled versus nontolled capacity expansion, but rather to study a potential future system of express toll lanes.

The study evaluated impacts that the MnPASS implementation would have on existing transportation system and policy plans, and addressed operational and financial implications of alternative networks of MnPASS lanes in the Twin Cities Metropolitan area. The study determined the extent to which these lanes could be self-supporting and how they might fit into the larger transportation system.

To support the project's goals and objectives, the study had to consider both those segments with sufficiently high travel demand to provide immediate financial leverage for construction, as well as those segments that were consistent with a long-term regional vision but may have been too costly to implement quickly. The original focus of the study was on the segments that could be built relatively quickly in partnership with the private sector, and as a result, the financial viability of potential MnPASS segments was an important factor in developing system recommendations. As the study progressed and it became clear that toll revenues would not recoup the required capital investment, the focus of the study shifted to developing a long-term MnPASS vision managed by the public sector.

Results from the MnPASS System Study are consistent with Mn/DOT's strategic objectives. The vision articulated in Mn/DOT's 2003 Strategic Plan calls for *"a*

coordinated transportation network that meets the needs of Minnesota's citizens and businesses for safe, timely and predictable travel." The MnPASS System Study supports this vision by looking beyond individual corridors to a regionally interconnected system of toll lanes. In addition, the managed-lane concept will be dynamically priced so that the MnPASS lanes can consistently achieve higher speeds and more reliable travel times than the untolled lanes.

The MnPASS System Study is also consistent with Mn/DOT's strategic direction to "make the transportation network operate better." MnPASS supports the objectives of this strategic directive by addressing traffic congestion in the Twin Cities metropolitan area, improving mobility within highly traveled corridors (including transit improvements), and exploring potential partnerships with the private sector.

SUMMARY OF FINDINGS

The following are key findings from the MnPASS System Study:

- MnPASS lanes are a new transportation "product" that can provide a congestion-free alternative, as long as tolls are charged. MnPASS users enjoy significant time savings, but nonusers and the transit system are also expected to benefit.
- Public investment is required since the MnPASS lanes are not expected to be self-sustaining from tolls. Typical segments will recover about 15-55 percent of their capital cost; on average, only 22 percent of the regional MnPASS system capital costs could be expected to be recovered from tolls. Although not self-sustaining, new revenue from tolls can contribute to closing the transportation program funding gap.
- The most financially viable segments, to be built from scratch, are not in the region's 25-year Transportation Policy Plan (TPP).[2] Advancing these projects would require modifying the TPP and likely delaying other projects. However, leveraging money in the TPP would require waiting many years, since the projects that are in the TPP also require an infusion of public investment.
- The HOT lanes now under construction on I-394 and proposed in this study on I-35W are expected to fill up with HOV traffic by 2030. Since HOVs cannot be priced out of the MnPASS lanes, the lanes are predicted to become congested and leave little room for paying vehicles. The long-term success of

[2] The TPP was still being developed during this study. The analyses in this report are based on the draft plan dated November 16, 2004. The Metropolitan Council's final 2030 Transportation Policy Plan was adopted on December 15, 2004 and is available at: http://www.metrocouncil.org/planning/transportation/TPP/2004/summary.htm

the HOT concept may require flexibility in the HOV definition, such as changing the definition from HOV 2+ to HOV 3+ or vanpools only.

STUDY FRAMEWORK

The study began with a blank slate, meaning that any existing or proposed highway in the metropolitan area was a candidate for the addition of MnPASS lanes. The consultant team worked with a study Steering Committee and Technical Group to develop evaluation methods and criteria to narrow the focus of the study as more information became available.

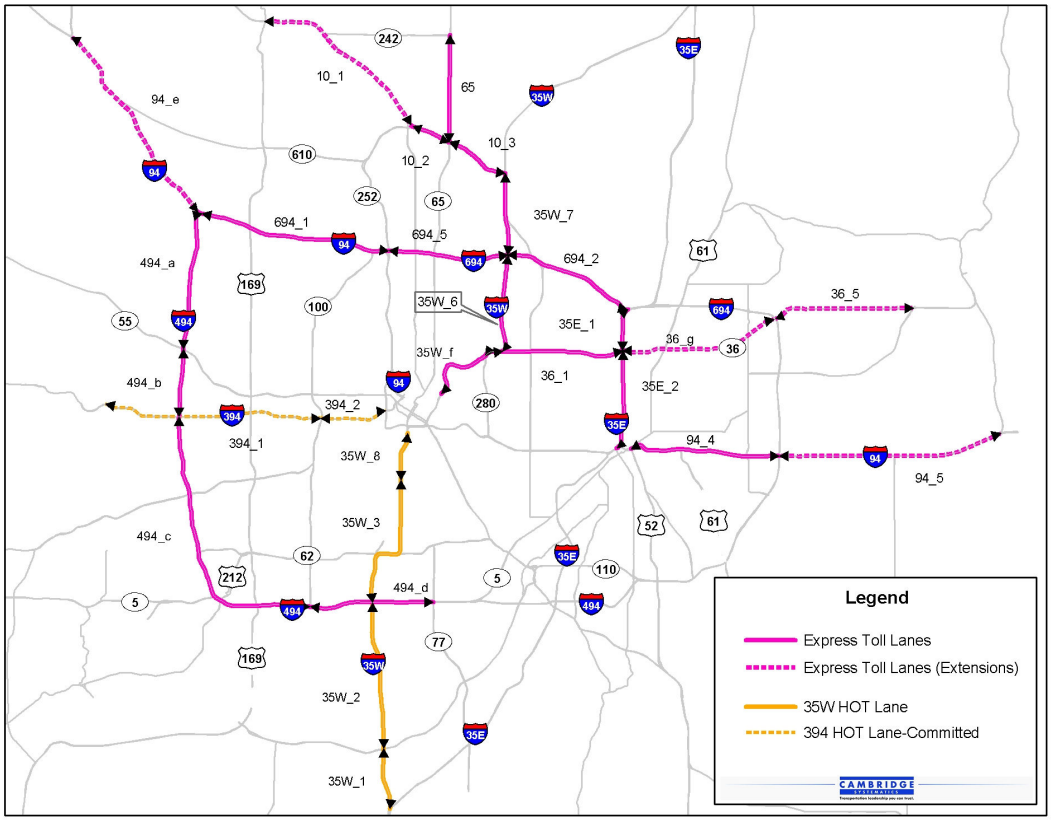
An early screening effort using readily available data led to two rounds of technical analysis aimed at understanding the financial and system implications of different combinations of MnPASS lanes.

At the conclusion of the first round of analysis, the consultants worked with the study committees to define a 144.5-mile system of 28 highway segments called **Concept A** that would form the basis for the more detailed Round 2 work (see Figure ES-1). In this figure, the "express toll lanes" represent the best segments that emerged from the first round of analysis, and the "extensions" represent segments that performed less well, but might be logical to combine with projects on other corridors. The system of potential MnPASS segments in Concept A was then evaluated in terms of cost through two different lenses, referred to as Concept A-1 and Concept A-2.

In **Concept A-1**, the costs of building MnPASS lanes "from scratch" were treated as "MnPASS costs," assuming the highway network committed to be built by 2013 is already in place. No contributions were assumed from projects in the 2030 TPP. In most cases, we assumed that the MnPASS lanes were added without reconstructing existing lanes. [3]

[3] This assumption in Concept A-1 could tend to understate the cost of an actual project that Mn/DOT may want to build, but does reflect the cost of building just an additional lane.

Figure ES.1 Concept A Map



In **Concept A-2,** only those projects already included in the 25-Year TPP were considered for MnPASS treatment. The TPP is the Twin Cities' long-range transportation plan that includes policies and projects to slow the region's growth in congestion and improve mobility. Under Concept A-2, the incremental cost of converting a TPP lane-addition project to a MnPASS lane (gantries, striping, additional buffer zones, etc.) was assumed to be the "MnPASS cost." Concept A-2 was intended to investigate which segments could best leverage Mn/DOT investments already planned in the TPP.

A key "ground rule" of this study was that no existing lanes, lanes presently under construction, or new lanes proposed in Mn/DOT's 10-year Construction Work Program (CWP) could be considered for conversion to MnPASS. The only exception to this ground rule was for the existing and planned HOV lanes on I-35W, which were proposed in this study as HOT lane conversions. While the study committees agreed to these ground rules, not all individuals on the committees endorsed them.

SUMMARY OF TECHNICAL FINDINGS

MnPASS lanes are an innovative new transportation product that provides a way to build new capacity that will remain uncongested as long as tolls are charged.

Few transportation strategies can accomplish this. The 144.5-mile MnPASS system represented by Concept A could be expected to save almost 32,000 vehicle hours of travel (VHT) per day in 2010 and almost 177,000 VHT in 2030 when measured over the entire Twin Cities metropolitan area highway network (see Table ES-1). On the highways with MnPASS, increased speeds are expected not only for MnPASS users, but also for users of the adjacent untolled lanes.[4] MnPASS users are also expected to travel about 20 mph faster than users of the adjacent untolled lanes, on an average daily basis.

Table ES.1 Network and System Performance Summary: Concept A

	2010	2030
Regional Network Performance[a]		
Daily Vehicle Hours Saved	31,642	176,713
Change in Daily Vehicle Miles	382,801	-284,853[d]
Average Daily Speeds on Concept A MnPASS System[b]		
Future Base Condition	44.4 mph	34.6 mph
With MnPASS: All Lanes	48.0 mph	38.9 mph
With MnPASS: MnPASS Lanes Only[c]	65.5 mph	59.0 mph
With MnPASS: Non-MnPASS Lanes Only[c]	46.6 mph	37.4 mph

Notes:
[a] Regional highway network refers to the entire seven-county Twin Cities metropolitan area as represented by the Metropolitan Council's travel demand model.

[b] MnPASS System refers to the system of MnPASS lanes represented in Concept A, and the non-toll highway lanes immediately adjacent to them.

[c] Does not include potential HOT lanes on I-394 and I-35W.

[d] The decrease in daily 2030 vehicle miles, as compared to the No Build condition, is due to travelers shifting from SOVs to HOVs, which reduces the total number of vehicles.

As compared to the no-build traffic forecasts in 2010 and 2030 on the 2013 highway network, the daily vehicle miles of travel (VMT) over the entire regional network is expected to increase by over 380,000 when comparing 2010 traffic forecasts, but decreases by over 280,000 when comparing 2030 traffic forecasts. The No Build and Build scenarios use a fixed trip table, so changes in VMT and

[4] In most scenarios, the MnPASS lanes will result in small regional increases in VMT. Most highway capacity increases will have this impact as some travelers shift modes from transit or change their auto travel patterns to take advantage of the new capacity. However, because of the reduction in congestion, VHT decreases more than VMT increases, resulting in improved average speeds which are calculated by dividing VHT by VMT. Future improvements to the regional transit system might negate this forecast VMT increase.

VHT are due to mode shifts and/or route diversions, not changes in trip distribution. The decrease in 2030 VMT is due to a forecast shift from the SOV to the HOV mode, which reduces the number of vehicles traveling. Under 2030 travel conditions, we found a mode shift from SOV to HOV, meaning that the same number of people would be traveling in fewer vehicles. The fewer vehicles yield the lower level of VMT. This is consistent with the finding that the HOV lanes will fill up with HOV traffic in 2030, and should be viewed with caution. Although 2030 VMT on a *regional* basis decreases, the VMT on the actual *system* of MnPASS lanes and the non-tolled adjacent lanes increases in both 2010 and 2030.

Although MnPASS lanes are predicted to favorably improve system performance, our analysis shows that the cost of building any system of these lanes cannot be recovered through toll revenues alone, as has sometimes been suggested. Building MnPASS lanes also requires significant public investment beyond the 22 percent on average of the capital costs that could be expected to be recovered from tolls if the toll lanes are built "from scratch" without any contribution from the Transportation Policy Plan, as defined in Concept A-1. Nevertheless, these segments represent the best early opportunity targets for Mn/DOT to build without TPP funding because cost recovery would be the largest and the funding gap the smallest. However, these segments, absent some of the connections which only become viable with TPP funding (see Concept A-2), do not in and of themselves constitute a complete system of MnPASS lanes. The consultant-recommended system of MnPASS lanes using Concept A-1 cost criteria, together with system performance measures, is shown in Figure ES-2. The first tier recommendations represent the most attractive segments, the second tier recommendations represent segments that are promising but performed less well, and the HOV conversion on I-35W is recommended assuming potential future changes in high-occupancy eligibility criteria.

If the lanes are built by leveraging the cost contributions from the region's TPP as defined in Concept A-2, the cost recovery ratios are much better – combined, the TPP segments recover 75 percent of capital cost. However, since there are few highway widening projects in the TPP, the projects that do best financially under this scenario do not, by themselves, constitute a complete system of MnPASS lanes. The consultant-recommended system of MnPASS lanes under the Concept A-2 method of cost allocation is shown Figure ES-3.

Figure ES.2 Consultant Recommended MnPASS System Assuming No TPP Contributions (Concept A-1)

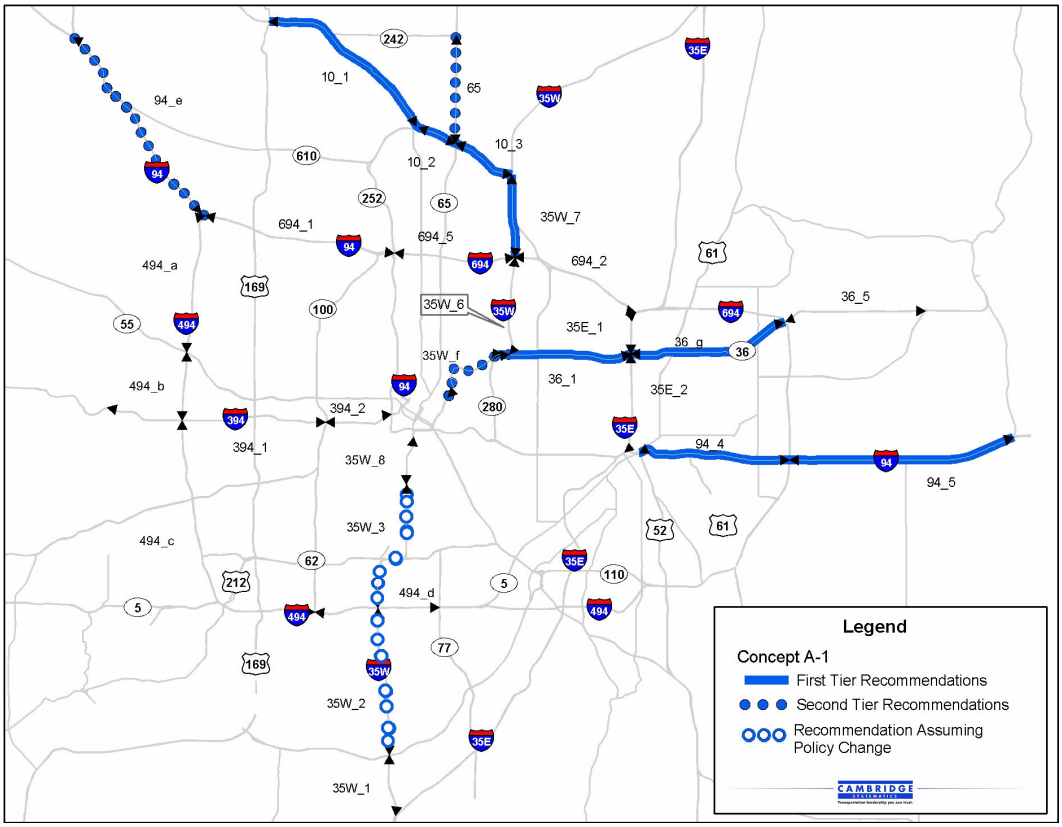
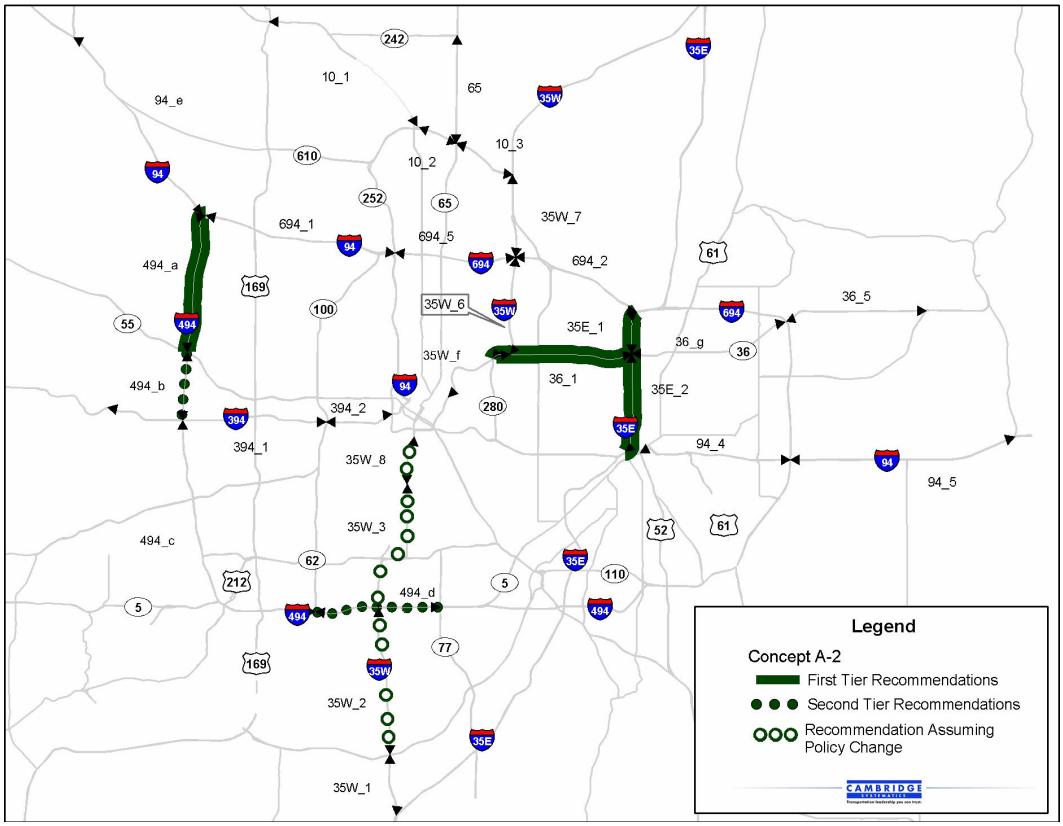


Figure ES.3 Consultant Recommended MnPASS System Assuming Leveraging TPP Contributions (Concept A-2)



The consultant-recommended system of MnPASS lanes under Concept A-1, including all three types of recommendations, would cost $1.2 billion, with a cost recovery ratio of 33 percent and a funding gap of $754 million (see Table E-2). Under Concept A-2, where the only cost of MnPASS implementation was assumed to be the cost of adding MnPASS features to lane additions that were already planned and funded, the capital cost of the consultant-recommended system (all three types of recommendations) was $378 million, with a cost recovery ratio of 45 percent and a funding gap of $188 million.[5]

Table ES.2 System Financial Performance Summary

	Capital Cost (2004$M)	Cost Recovery Ratio	Funding Gap (2004$M)
Concept A-1	$1,234	33%	$754
Concept A-2	378	45%	188

The projects that we found to be the most financially viable as "from scratch" projects are not in the Transportation Policy Plan. They are projects in rapidly growing areas on the outskirts of the metropolitan region that provide a combination of relatively low cost and relatively high demand. For example, the U.S. 10 corridor north of the Twin Cities and I-94 east of St. Paul were both identified as First Tier Recommendations. The stand-alone financial viability of projects decreases considerably as the projects get closer to the urban core – the result of the high cost of building in these denser areas. Advancing these projects that are not in the TPP would require modifying the TPP, and likely delaying other projects already in the plan.

By definition, the projects that are in the policy plan also require an infusion of public investment. Therefore, these TPP projects are also likely to be many years away in terms of potential implementation.

HOV Conversion Issues

Several of the MnPASS projects envisioned converting existing or planned HOV lanes to HOT lanes. Our analysis assumed that the "high occupancy" would continue to be defined as two or more people in a vehicle. Under those conditions, we found that HOVs would occupy most of the managed lane capacity by 2030, leaving little room to be sold to single-occupant vehicles. We have not conducted an independent assessment of the HOV forecasts generated by the Metropolitan Council's travel demand model. HOV use in the region and nationally has in fact declined as a share of total travel demand over the past few decades. Nevertheless, it is reasonable to assume that as traffic grows, so will the

[5] The consultant-recommended system using Concept A-2 includes the I-35W HOV conversion to HOT lanes, which is not included in the TPP.

volume of HOVs (if not the market share). Thus, the concern that too many HOVs will make tolling unfeasible is real. If HOV to HOT lane conversions are pursued, Mn/DOT should build some flexibility into the definition of HOVs, with the potential to evolve from the current 2+ passenger definition to a 3+ standard or to a vanpool and transit vehicle-only standard.[6]

Implications of Technical Findings

The findings of the Round 2 analysis were presented to the Technical Group and Steering Committee on January 28, 2005. The reaction of these groups was that there should be less emphasis on the immediate financial feasibility of individual segments or systems of segments, and more attention paid to an ultimate long-range system of MnPASS lanes in the Twin Cities region that would be built over time.

The study teams also felt that using financial payback criteria as a means of project selection was unusual in a metropolitan or statewide transportation planning context, since traditional highway projects do not contribute a revenue stream. Transit projects are different, in that they do generate revenue to help pay operating costs. Despite the finding that the MnPASS toll lane projects do not seem to be self-supporting, the idea that they can pay back some of their capital costs (lane construction costs and MnPASS incremental costs), albeit at the 22 percent level on average, is actually much more than any other type of capacity project can produce.

Another way to look at the financial potential of the MnPASS system is to consider the ability of the system to cover the incremental cost of building MnPASS lanes over and above the cost of building the lanes as traditional (non-tolled) lanes. Of the $3.5 billion in construction cost to build Concept A from scratch, about $0.6 billion is attributable to the incremental cost of making these lanes ready for MnPASS. This is the cost of buffer zones, gantries, and system connections. This amount is just about covered by the estimated $0.7 billion in net toll revenue expected from the MnPASS lanes (over and above operating costs, and discounted). The implication of these numbers is that we would expect the toll revenue from MnPASS to cover the incremental cost of building MnPASS, but would not provide significant dollars to the region's highway funding needs.

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[6] Similar issues would emerge with any variation in the definition of vehicles which might be allowed to use MnPASS lanes for free. For example, the study was asked to examine the feasibility of allowing hybrid technology vehicles into the lanes for free. If such a policy was "successful" in increasing the market share of hybrid vehicles in the region, the potential exists to overwhelm the MnPASS lanes with free users (carpools and hybrids). With little excess capacity to sell to SOV drivers, both the traffic management and revenue potential of the lanes would be compromised. This scenario is playing out right now on HOV lanes in Northern Virginia, particularly on I-95/395.

Because this study has shown that the financial benefits from MnPASS lanes are relatively small, the study team came to view MnPASS as more of a long-term traffic management solution rather than as a way to accelerate projects through toll revenue financing. MnPASS's revenue generating aspects are more of a side benefit. The study team also saw the potential long-range benefits of MnPASS leveraging the Twin Cities' transit system in terms of enhanced express bus or bus rapid transit (BRT) service.

With these findings and reactions in mind, the Round 2 results were used as a stepping stone to outline a broader vision of how the MnPASS concept could be integrated into the Twin Cities' long-term transportation system.

POTENTIAL 2030 MNPASS VISION

The result of the Technical Group's and Steering Committee's deliberations about the Round 2 findings was the desire to lay out a long-range plan for an interconnected system of MnPASS lanes. The consultant team worked with the project committees to develop a map of MnPASS projects that could be developed in the general timeframe of the current Transportation Policy Plan (about 25 years).

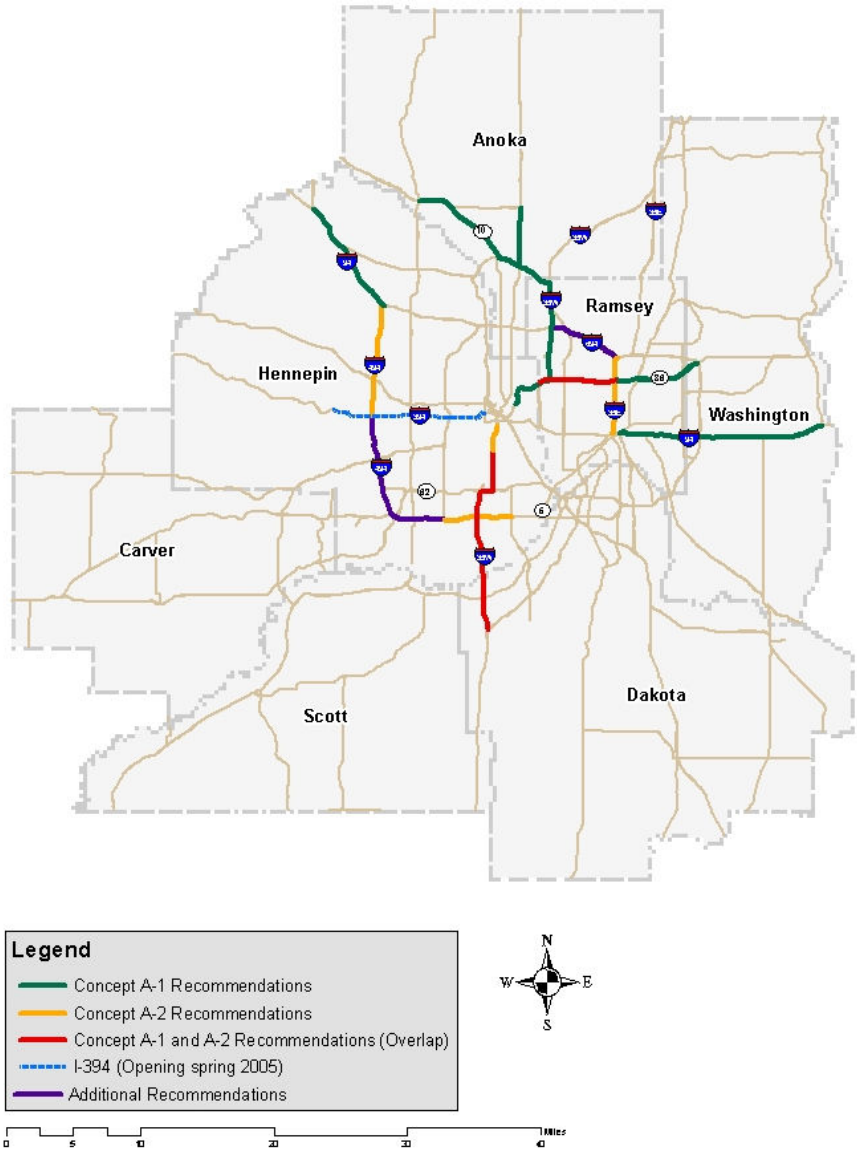
The proposed 2030 Vision Map (see Figure ES-4) is intended to show projects that would:

- Implement a portion of the current TPP as toll lanes, meaning all the projects shown in Concept A-2 in the previous section; and
- Implement other projects not yet in the TPP, but which were shown to be potentially viable; these are all of the projects that were included in Concept A-1, in addition to others that were not immediately recommended.

The study team was also interested in pursuing a policy that would ensure future capacity expansions are considered for the possible application of MnPASS lanes. This means that potential projects that are not on today's 2030 Vision Map might ultimately be developed as MnPASS lanes. The 2030 Vision Map represents current thinking on where MnPASS lanes would be the most effective; however, other future capacity expansions could be considered as MnPASS lanes and connected to the system as well.

The proposed 2030 Vision Map does not attempt to prioritize projects. It also does not distinguish between regular MnPASS lanes, where all drivers pay, and HOV lane conversions to HOT lanes, where HOVs drive for free. Certainly, the HOV lane conversions will need to address the issue of long-term HOV definition if toll lanes are to be advanced on these corridors. Finally, this Vision Map does not presume that MnPASS lanes are the preferred or most cost-effective solution to congestion and mobility in the Twin Cities region.

Figure ES.4 MnPASS 2030 Vision Map



Costs and Long-Term Revenue Potential of the 2030 Vision Map

To put the 2030 Vision Map in perspective, we developed an overall estimate of the costs and toll revenue potential of the projects on that map. We used the Concept A-2 view of considering costs, which results in a cost estimate that is over and above the costs already planned to be spent in the 2030 TPP. Table E-3 shows the cost and revenue potential of each of the segments on the 2030 Vision Map. Overall, the cost of implementing MnPASS on these highway segments would be $2,363 million greater than the amount planned to be spent in the TPP.

Table ES.3 Potential 2030 MnPASS Vision Financial Analysis, Concept A-2 Costs

Segment	Net Revenue (2004$M) 2010	Net Revenue (2004$M) 2030	PV of Net Revenue Stream (2004$M) 2008-2030	Capital Cost (2004$M)	PV of Capital Cost (2004$M)	Cost Recovery Ratio	Funding Gap (2004 $M)	Average Daily Speed Savings in 2030 (Build versus No-Build) (mph)
I-494-a	$1.6	$2.8	$27.2	$34.7	$31.5	86%	$4.3	4.3
I-494-b	0.2	0.9	6.1	132.5	120.2	5%	114.1	2.2
I-494-c	3.0	6.2	55.2	265.6	240.8	23%	185.7	4.2
I-494-d	4.1	8.0	72.4	18.7	17.0	427%	-55.5	5.2
I-694-2	1.2	3.1	24.9	241.4	218.9	11%	194.0	4.2
I-94-e	0.6	2.3	16.5	115.5	104.7	16%	88.2	3.5
I-94-4	1.9	3.0	30.2	122.1	110.7	27%	80.5	13.2
I-94-5	1.2	2.3	21.5	105.4	95.6	23%	74.1	2.8
36-1	1.7	2.5	26.2	72.1	65.4	40%	39.2	5.2
36-g	2.5	4.4	42.0	172.6	156.5	27%	114.5	5.2
36-5	0.9	2.1	17.9	122.4	111.0	16%	93.1	7.3
I-35E-1	0.0	0.6	2.8	64.8	58.7	5%	55.9	3.5
I-35E-2	3.4	4.8	51.3	47.7	43.2	119%	-8.0	6.3
I-35W-1	-0.7	-1.6	-13.7	50.7	46.0	-30%	59.7	12.0
I-35W-2	0.0	-0.4	-1.9	3.0	2.7	-68%	4.6	-3.1
I-35W-3	-0.6	-1.6	-12.5	2.0	1.8	-684%	14.3	-8.4
I-35W-8	-1.0	-2.0	-18.0	2.0	1.8	-983%	19.8	6.9
I-35W-f	2.4	2.9	34.2	140.0	127.0	27%	92.7	3.8
I-35W-6	2.1	3.4	34.1	159.7	144.8	24%	110.7	3.9
I-35W-7	3.2	5.0	50.9	126.2	114.4	44%	63.5	3.2
10-1	4.4	7.0	70.9	141.4	128.2	55%	57.4	6.4
10-2	1.3	2.2	21.7	15.3	13.9	156%	-7.8	6.2
10-3	0.9	2.3	18.5	51.8	47.0	39%	28.5	4.0
65	2.6	5.3	47.4	155.6	141.1	34%	93.7	6.2
I-394-1	1.6	1.7	21.9	N/A	N/A	N/A	N/A	1.0
I-394-2	0.8	0.5	8.8	N/A	N/A	N/A	N/A	1.2
MnPASS Vision Total	**$39.3**	**$67.7**	**$656.2**	**$2,363.3**	**$2,143.0**	**31%**	**$1,486.8**	**3.7**

Notes: Real Discount Rate: 4%
Inflation Rate: 3%
PV = Present value of future cash flows, discounted to 2004.
Cost Recovery Ratio = PV of Net Revenue Stream/PV of Capital Cost.
Funding Gap = Net Present Value of discounted future costs minus revenue.

Assuming these projects were all built by 2008, the cost recovery ratio for this project set is forecast to be 31 percent, from a revenue stream whose present value is $656.2 million.[7]

In addition to revenue potential, the MnPASS system shown in the Vision map would be expected to generate other benefits, such as opportunities for improved transit service, improved reliability, reduced air pollutants, and the value of offering drivers an uncongested travel choice. Although not quantified in this study, these characteristics would also provide great benefit to the Twin Cities.

POTENTIAL NEXT STEPS

The MnPASS System study has shown the user benefits and financial implications of MnPASS segments and systems of segments, and a proposed vision for a long-term system of MnPASS lanes around the Twin Cities. The study has also provided a forum for various stakeholders to express their ideas about how the MnPASS system might actually be developed. A separate document related to overall policy recommendations has been drafted by the MnPASS System Study Steering Committee.

If Mn/DOT chooses to move forward with implementing the MnPASS vision outlined above, numerous issues must still be addressed. This report lays out a potential series of next steps that Mn/DOT might undertake if it desires to move the MnPASS concept along. These steps include the following:

- Demonstrating the MnPASS concept through evaluation of the I-394 HOV lane conversion project that is to open in spring 2005;
- Conducting further systems analysis including the benefits and costs of MnPASS compared to other alternatives;
- Engaging in a case study of one or two corridors, where various technical issues can be explored in more detail; and
- Addressing institutional issues.

Institutional issues requiring further discussion include questions related to the role of the private sector in developing/operating MnPASS lanes, sources of

[7] It is important to note that the assumption of all projects being built by 2008 is strictly an analytical device that allows one project to be compared to another on an even footing. In reality, these projects would be built over the cycle of the TPP, meaning that the actual revenue potential from a MnPASS system would be considerably less than indicated for the given period of time. However, projects developed later in the TPP cycle would have a life for purposes of analysis that extends beyond the 2030 timeframe. A more refined estimate of revenue over the life of the TPP would need to include some assumptions regarding the phasing of projects over time.

financing, how projects would be selected and advanced for implementation, how MnPASS revenues should be treated, how Mn/DOT and the Metropolitan Council should incorporate MnPASS into their project development processes, and how these findings relate to Mn/DOT's desire to issue a Request for Proposals for Partners (RFPP) to continue the development of MnPASS lanes.

Taking these steps will help Mn/DOT develop the proper strategies, standards, and policies necessary to move forward with the MnPASS program.